Fault Tolerant Software-Defined Radio on Manycore, Phase II
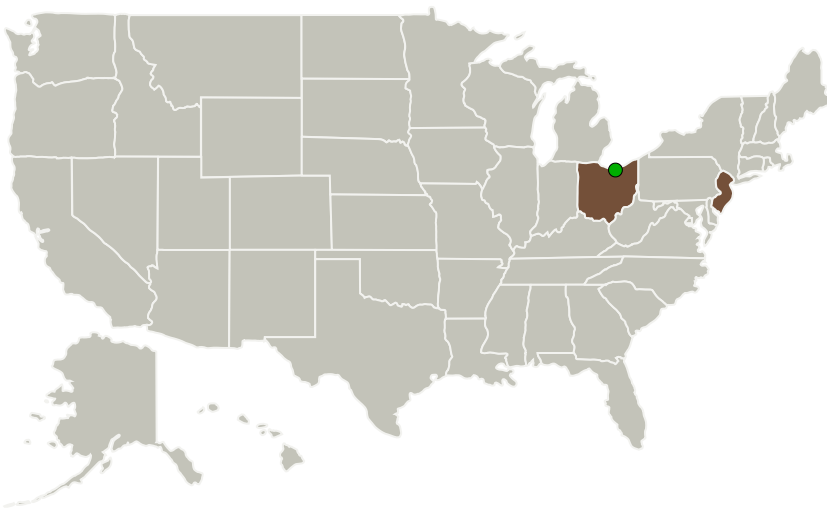
Completed Technology Project (2011 - 2013)

Project Introduction

Mobile communications systems require programmable embedded platforms that can handle computationally demanding signal processing codes without the burden of high power consumption. As hardware performance improves, technology trends have shifted functionality from the gate level up to software, as demonstrated by the emergence of software defined radio. Traditionally, these platforms rely on FPGAs and DSPs, but such architectures bring with them significant software development challenges. Application demands for radiation mitigation and fault tolerance exacerbate programmability issues. Low-power general purpose processors offer improved programmability, but cannot meet performance requirements. Our solution, Resilient, provides a sweet spot with its manycore-based software defined radio. Resilient is a software defined radio for space based on rad-hard multi-core digital processing. Resilient has a number of key characteristics and capabilities. Firstly, it is based on the Maestro rad-hard multicore processor. Maestro will provide about 100 times the throughput of the current state of the art in rad-hard general purpose processors. Secondly, Resilient is a highly flexible radio, providing uninterrupted real time multimode operation, over-the-air reconfiguration and adaptability, and STRS compliance. It can also serve as a highly programmable research stage prototyping device for new waveforms and other communications technologies. Finally, Resilient can also support non-communications codes on its high performance multicore processor, co-located with the communications workload, reducing the SWaP of the overall system by aggregating processing jobs to a single board computer.
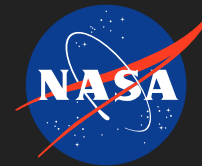
Primary U.S. Work Locations and Key Partners

Fault Tolerant Software-Defined Radio on Manycore, Phase II

Table of Contents

For more information and an accessible alternative, please visit:
https://techport.nasa.gov/view/8988

Organizations Performing Work	Role	Type	Location
MaXentric Technologies, LLC	Lead Organization	Industry	Fort Lee, New Jersey
🟢 Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
New Jersey	Ohio

Project Transitions

▶ **June 2011:** Project Start

✔ **May 2013:** Closed out

Closeout Documentation:
- Final Summary Chart(*https://techport.nasa.gov/file/138864*)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

MaXentric Technologies, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management
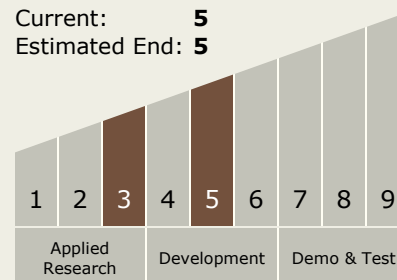
Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Scott Ricketts

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**

1	2	3	4	5	6	7	8	9
Applied Research			Development			Demo & Test		

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  └ TX05.2 Radio Frequency
    └ TX05.2.4 Flight and Ground Systems

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System